

## CLAIMS

1. A polymer electrolyte fuel cell comprising:  
a polymer electrolyte membrane;  
an anode and a cathode sandwiching said polymer electrolyte membrane therebetween;

an anode-side conductive separator plate having a gas channel for supplying a fuel gas to said anode; and

a cathode-side conductive separator plate having a gas channel for supplying an oxidant gas to said cathode,

wherein each of said anode-side and cathode-side conductive separator plates comprises a metal plate, an oxidation-resistant conductive film covering partially or entirely a surface of said metal plate facing said anode or cathode, and a diffused layer resulting from diffusion of a material of said conductive film at an interface between said metal plate and conductive film.

2. The polymer electrolyte fuel cell as set forth in claim 1, wherein said conductive film is composed of noble metal.

3. The polymer electrolyte fuel cell as set forth in claim 1, wherein said conductive film is composed of an interstitial compound.

4. The polymer electrolyte fuel cell as set forth in claim 3, wherein said interstitial compound is a nitride or carbide of an element selected from the group consisting of Ti,

Cr, Zr, Al, Ta, and W.

5. The polymer electrolyte fuel cell as set forth in claim 1, wherein said surface of said metal plate facing said anode or cathode is coated with said conductive film in an island pattern, and a corrosion-resistant film is formed in a portion of said metal plate where said conductive film is not formed.

6. A polymer electrolyte fuel cell comprising:

a polymer electrolyte membrane;

an anode and a cathode sandwiching said polymer electrolyte membrane therebetween;

an anode-side conductive separator plate having a gas channel for supplying a fuel gas to said anode; and

a cathode-side conductive separator plate having a gas channel for supplying an oxidant gas to said cathode,

wherein each of said anode-side and cathode-side conductive separator plates comprises a metal plate, an oxidation-resistant conductive compound film covering a surface of said metal plate facing said anode or cathode, and an intermediate layer composed of a metal element constituting said conductive compound at an interface between said metal plate and conductive compound film.

7. The polymer electrolyte fuel cell as set forth in claim 6, wherein said conductive compound is composed of an interstitial compound.

8. The polymer electrolyte fuel cell as set forth in

claim 7, wherein said interstitial compound is a nitride or carbide of an element selected from the group consisting of Ti, Cr, Zr, Al, Ta, and W.

9. The polymer electrolyte fuel cell as set forth in claim 6, wherein said conductive compound film has a change in a component ratio of an element constituting said conductive compound film from an interface between said conductive compound film and said intermediate layer toward a surface of said conductive compound film.

10. The polymer electrolyte fuel cell as set forth in claim 6, comprising a diffused layer resulting from diffusion of a metal element of said intermediate layer, at an interface between said intermediate layer and metal plate.

11. A polymer electrolyte fuel cell comprising:

a polymer electrolyte membrane;

an anode and a cathode sandwiching said polymer electrolyte membrane therebetween;

an anode-side conductive separator plate having a gas channel for supplying a fuel gas to said anode; and

a cathode-side conductive separator plate having a gas channel for supplying an oxidant gas to said cathode,

wherein each of said anode-side and cathode-side conductive separator plates comprises a metal plate and an oxidation-resistant conductive film covering partially or entirely a surface of said metal plate facing said anode or cathode, and said conductive film is composed of an

interstitial compound.

12. The polymer electrolyte fuel cell as set forth in claim 1, 6 or 11,

wherein said anode-side conductive separator plate comprises a metal plate having grooves or ribs for guiding the fuel gas on its surface facing said anode, and an insulating sheet that forms a gas channel for guiding the fuel gas from a supply side to a discharge side on the surface of said metal plate in cooperation with said grooves or ribs, and that has elasticity to function as a gasket for preventing the fuel gas from leaking out of said gas channel, and

said cathode-side conductive separator plate comprises a metal plate having grooves or ribs for guiding the oxidant gas on its surface facing said cathode, and an insulating sheet that forms a gas channel for guiding the oxidant gas from a supply side to a discharge side on the surface of said metal plate in cooperation with said grooves or ribs, and that has elasticity to function as a gasket for preventing the oxidant gas from leaking out of said gas channel.